

KENNETH C. FERRONE, PE, GE, PG, CEG

POSITION IN FIRM: Principal Geotechnical Engineer & Engineering Geologist, President

TOTAL YEARS OF EXPERIENCE: 30 years

KEY QUALIFICATIONS: Mr. Ferrone is experienced in providing civil, geotechnical, and engineering geology consulting and project management services for a variety of clients. He specializes in establishing positive communication with the project team to ensure successful projects, including aiding clients/owners in their planning decisions. Mr. Ferrone's qualifications include providing geotechnical engineering and geological review during planning/feasibility phases, providing consultations during project meetings, preparing scopes of work for research, field exploration, laboratory testing, and analyses, performing and supervising field investigations, performing geotechnical and geological analyses based on the results of field and laboratory work, preparing geotechnical and geological based designs, and publishing reports providing design and construction criteria for projects. During the design phases of projects, Mr. Ferrone provides detailed review services to check that the project's geotechnical and geological recommendations are incorporated into the plans and specifications for the projects. He also establishes geotechnical and geological quality control/quality assurance during the design and construction phases of projects. Mr. Ferrone provides geotechnical and geological construction observation, testing, and monitoring services during the construction phases of projects to assure that the project specific geotechnical/geological recommendations are implemented during construction. He also provides clients/owners with construction management services to facilitate project completion. Mr. Ferrone is also qualified to provide expert and forensic investigation services for a variety of geotechnical, hydrological, geological, foundation, and drainage issues.

EDUCATION:

Bachelors of Science – Geology with Physics Minor, Dickinson College, Carlisle, Pennsylvania, 1985

Masters of Science – Geological Engineering, Mackay School of Mines, Univ. of Nevada – Reno, 1990

Professional Registrations (Registration No. and Date Acquired):

- State of California, Registered Professional Engineer in Civil Engineering (No. C 47277, 1991)
- State of California, Registered Professional Engineer in Geotechnical Engineering (No. GE 2513, 2001)
- State of California, Professional Geologist (No. PG 6667, 1997)
- State of California, Certified Engineering Geologist (No. CEG 2070, 1997)
- State of Nevada, Registered Professional Engineer in Civil Engineering (No. 16601, 2004)

Professional Societies: American Society of Civil Engineers, Geoprofessional Business Association, Association of Engineering Geologists, International Society for Soil Mechanics and Geotechnical Engineering, California Geotechnical Engineers Association

Honors and Awards: Graduate Teaching Assistant and Lecturer, Mackay School of Mines, University of Nevada - Reno, 1986-87

Experience Highlights:

- Geotechnical Engineering and Geologic Hazards Assessments for Infrastructure Facilities for Carollo Engineers, Jacobs, HDR Engineering, Brian Kangas Foulk, Biggs Cardosa Associates, Various Municipalities, Veterans Administration, NAVFAC, Various Wireless Companies, and others
- Geotechnical Engineering for Commercial Development Clients including Britannia Developments, Safeway, Perini Corporation, Prologis Trust, Longs Drugs, Pacific Development, and others
- Geotechnical Engineering and Geologic Hazards Studies for Schools and Hospitals in Northern California including Childrens Hospital Oakland, Oakland Unified School District, Merritt Hospital, Mt. Diablo Regional Medical Center, and others
- Geotechnical and Geological Engineering for numerous residential projects for William Lyon Homes, KB Home, Taylor Morrison, Toll Brothers, Meritage Homes, DeNova Homes, Standard Pacific, Pulte Homes, Signature Homes, Castle Companies, Trumark, and others
- Geotechnical Engineering and Geologic Hazard Evaluations & Assessments for numerous Forensic Investigations, Causation Analyses, and Remediation Design and Implementation
- Manuscript Reviewer – American Society of Civil Engineers, *Journal of Geotechnical and Geoenvironmental Engineering*

Publications: The Long-Term Failure Characteristics of Over-Consolidated Clay Shales in the Mount Diablo Region, UMI Publications, Ann Arbor, 1990.

Experience:

2000 to Present	Stevens, Ferrone & Bailey Engineering Company, Inc., President
1992 to 2000	HARZA Engineering Company, Senior Project Manager, Infrastructure Business Unit
1987 to 1992	Kaldveer Associates (Company acquired by HARZA), Engineer & Geologist
1986 to 1987	Geological Consulting Services, University of Nevada – Reno

RELEVANT PROJECT EXPERIENCE (More Project Descriptions Available Upon Request)

Residential

The Landing, Jack London Square, Oakland, CA

Client: Legacy Partners

Provided geotechnical and geological services for this 280-living unit apartment complex located adjacent to the Oakland Estuary, between the Oakland Village and the KTVU facilities in Jack London Square. The complex comprised of four, 3-story buildings over a one-story garage. Liquefaction dynamic densification, Bay Mud consolidation, and lateral spreading potential exist at the site which required Mr. Ferrone to provide the client with cost-effective development solutions including pile foundations. Seismic settlement and slope stability analyses were performed to provide detailed design criteria for pile foundations. Provided client with continuous line of communication to assess the project team's performance.

Landmark at The Ridge, San Bruno Mountain, Brisbane, CA

Client: Brookfield Homes

Mr. Ferrone provided engineering services for the design and construction of 71 residential lots on approximately 100 acres of steeply sloping hillsides of San Bruno Mountain in Brisbane, California. (The principals of SFB have been involved with the development and protection of approximately 750 acres of San Bruno Mountain since the 1980's, including the geotechnical engineering and construction observation and testing services for the planning, design, and construction of grading requiring the movement of approximately 3 million cubic yards of soil and rock.). The project included the long-term stabilization of slopes and protection of homes, private property, and public property from surrounding hillsides and subterranean water. Methods of slope stabilization designed by Mr. Ferrone included over-excavation of unstable soils and rock, construction of keyways and installation of subdrains, compaction of fill materials, installation of debris flow and sediment catchment walls, deflection walls, and the installation of both light duty and heavy duty erosion and sediment control measures such as lining for channels, hydroseeding and mulching, and anchored matting. Details, specifications, and SWPPP were prepared. During construction, Mr. Ferrone is providing construction observation and testing for all earthwork, grading, subdrain installation, wall installation, and all erosion and sediment control measures.

Mandalay Heights and Mandalay Point, San Bruno Mountain, South San Francisco, CA

Client: Western Pacific Housing

Provided assessments of surface and subsurface water flow from hillsides and drainage courses above project to determine extent of collection measures during the construction of project. Performed evaluation of surface and subsurface water flow collection and discharge facilities to assess performance during rainfall events and potential impact to project, both short-term and long-term. Prepared Storm Water Pollution Prevention Plans and Erosion Control Plans for duration of project construction. Consulted with Client and design team prior to construction and also during construction in order to provide recommendations for the design and construction of surface and subsurface water collection facilities to mitigate potential impacts to project.

Pacific Renaissance Plaza, Oakland, CA

Client: Perini Corporation for Pacific Renaissance Associates II

Construction of a 6-to 15-story commercial and residential structure with three levels of underground parking adjacent to underground BART tubes. The project site, located in downtown Oakland, was surrounded by at-grade city streets and low-to high-rise buildings requiring stability and settlement analyses and stabilization schemes to assure movement of existing structures would not occur. Building site was underlain by loose to dense Merritt sand and had high ground water conditions. Recommendations and conclusions regarding excavation shoring design criteria, dewatering, below grade wall design criteria, and mat foundation support were provided. Mr. Ferrone managed the design phase of the project, and designed and installed monitoring equipment during the construction phase.

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Connemara, Pacifica, CA

Client: O'Brien Homes

Mr. Ferrone provided engineering and construction inspection & monitoring services for the design and construction of a 25 lot development located in Pacifica, California. The development is surrounded by slopes inclined downward from the development at inclinations ranging from 3:1 to ½:1 (horizontal to vertical). The bedrock at this development is part of the Franciscan Complex. As part of the project development, detailed evaluations, designs, and specifications were prepared by Mr. Ferrone in order to protect improvements both above the slopes, below the slopes, and from subterranean water sources. Slope stabilization and improvement protection measures included retaining walls, geogrid reinforced modular block walls, over-excavation of unstable slopes and installation of keyed, drained and benched compacted fill materials, geogrid reinforced earthen masses, debris catchment fencing, and long-term erosion and sediment control measures. Detailed slope stability and rock fall evaluations were performed in order to prepare the most economical yet high quality slope stabilization and protection measures for the surrounding slopes. During design and planning phases, Mr. Ferrone met with City personnel and City consultants to discuss and eventually approve Mr. Ferrone's slope stabilization measures prior to the City approving the project. During construction, Mr. Ferrone provided construction observation and testing, monitoring, and inspections for all types of construction, and provided both the Client and City with on-going progress reports and final reports for various stages of construction.

Schaefer Ranch, Dublin, CA

Client: Taylor Morrison Homes

Performed review of geotechnical and geological reports, plans, and specifications for a hillside residential development of approximately 295 single-family lots, roadways, several commercial lots, water retention and detention basins, public parks, the extension of Dublin Boulevard, and the installation of underground utilities. Cuts and fills as deep as about 75 to 155 feet, respectively, were anticipated. Rock blasting operations and techniques were also reviewed. GHAD procedures were also evaluated. Literature and aerial photos were reviewed, geologic mapping was performed, performing and logging borings and pits occurred, supplemental lab testing was performed, and engineering evaluations and reporting was also performed. Following review services, performed detailed geotechnical and geological investigation for preparation of detailed design report, specifications, and construction plans.

Vista Del Mar, Pittsburg, CA

Client: William Lyon Homes

Performing geological and geotechnical peer review of hillside mass grading criteria for 500,000 and 1,000,000 cubic yard landslides. Scope of work includes detailed review of previous geological and geotechnical reports created over a several year time frame, aerial photo and geological/geotechnical literature review, field reconnaissance and mapping, review of boring and pit logs, photo documentation of all field work, review of laboratory testing procedures and results, review of slope stability analyses, evaluation of the project's civil, geological, and geotechnical engineering, creating cross-sections, interfacing with various groups and agencies, and preparation of written reports.

Pasadera Development, Monterey County, CA

Client: Rancho Monterey LLC

Mr. Ferrone managed and supervised engineering geology and geotechnical engineering investigations to support the realignment of a highway and the development of a 600-acre land parcel. The site was located in gently to steeply sloping terrain that included low-lying wet areas, steep hillsides, and areas of loose, windblown sand. The realignment of the highway included the investigation of approximately one mile of new alignment across loose, unstable sands that had been exposed to landsliding and erosion. Mr. Ferrone also managed and supervised engineering geology and geotechnical investigations for more than seven miles of roadway, three water tanks sites, two pump station sites, new pipelines, eight large containment ponds, a 40 foot high embankment dam, and a high profile clubhouse facility. An engineering geology and geotechnical investigation to upgrade an existing wastewater treatment facility was also performed. Settlement, potential liquefaction, and slope stability, along with numerous springs and seepage areas, were issues that were investigated and analyzed. Erosion control and storm water management were of primary importance due to the high erosion potential of the wind-blown sands. Mr. Ferrone's team began investigations at the site during the early planning stages to identify areas where geologic hazards existed, and required special design and

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construction techniques. His team worked closely with the client to develop methods to effectively mitigate the unique problems associated with the site. The team then monitored field conditions during construction and provided onsite supplemental recommendations as needed. The work was performed within budget and schedule, and the contractor and developer completed many aspects of the project ahead of schedule due to Mr. Ferrone's onsite expertise during construction.

Gossamer Residential Developments, Redwood City, CA

Various Clients

Mr. Ferrone provided detailed earthwork, drainage, and foundation recommendations for the design and construction of over 250 residential lots at the Gossamer developments in Redwood City. Subsurface conditions included thin mantle of old fill materials overlying highly compressible Bay Mud ranging in thickness from a few feet to as much as 80 feet. Detailed settlement analyses were performed and both short-term and long-term ground surface settlements were estimated. Designs included the ability for the neighborhoods to settle uniformly rather than differentially so that differential movements would not be a long-term issue for both the homes and the associated infrastructure.

Communication Hill, San Jose, CA

Client: Western Pacific Homes

Project manager for a geologic hazards study and geotechnical investigation for this residential development. The purpose of our investigations was to evaluate the soils and rock and provide recommendations concerning the geologic and geotechnical engineering aspects of the project. The Communication Hill Residential Development consisted of developing the approximately 300 residential townhomes and associated roadway and parking areas. Cuts and fills of up to about 30 feet deep were performed to develop the site for the townhomes. Mr. Ferrone provided consultations and construction observation and testing services during the construction phase of the project.

Hiller Highlands Phases IV and V, Oakland, CA

Client: Pearson & Johnson

Mr. Ferrone acted as the geotechnical project manager for the reconstruction of over 100 single and multi-family residential units in the Oakland Hills following the firestorm of 1991. Site conditions ranged from engineered and non-engineered fills, landslide deposits and highly altered and sheared claystone and sandstone bedrock. Mr. Ferrone's responsibilities included an exploratory boring program, geologic mapping and hazard evaluation, construction plan reviews and foundation construction monitoring. Responsible for detailed geologic mapping of area including evaluation of existing slope instability features. Supervised extensive subsurface exploration program and laboratory investigation. Performed slope stability evaluation. Provided detailed conclusions and recommendations for re-development in written report.

Residential Subdivision, Danville, CA

Client: Confidential

Mr. Ferrone performed and supervised geologic hazard assessment of steeply sloping hills for a proposed subdivision. Geologic mapping and slope stability analyses were performed and a resulting slope stability map prepared. Prepared report providing recommendations for the remediation of potential slope stability hazards including erosion and landsliding.

Brookside Estates Residential Subdivision, Antioch, CA

Client: O'Brien and Hicks

Performed and managed investigation of the location of earthquake faults in conjunction with this residential development. Fault investigation included 2,500 linear feet of fault trenching through clays, silts and sedimentary bedrock. Development included over 300 lots with appurtenant roadways and utilities. Provided design and construction for the development.

Park Manor, Morgan Hill, CA

Client: Sterling Communities

Mr. Ferrone provided geotechnical engineering design and construction observation and testing services for the residential subdivision, consisting of thirty-five, 1-to 2 story private residences with appurtenant roadways. Site conditions included highly expansive clays, high ground water conditions, and very weak soils.

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Monte Fiore and West Ridge Roads, Scotts Valley, CA

Client: Ryland Homes

Mr. Ferrone provided geotechnical and geological engineering services during the design and construction phases of the 56-lot subdivision and ridge line roadway project. Provided client with cost-effective solutions for slope and landslide stabilization, ground improvement and strengthening, and residential foundations. Stabilized hillsides for ridgeline roadway construction in order to access a custom lot subdivision. The site was bounded by hillsides, unstable soils and rock, and included a wetlands/wildlife area through its center. Mr. Ferrone worked closely with the owner, contractors, and the City of Scotts Valley to assure that the geologic and geotechnical hazards were properly stabilized and mitigated.

Navair Manor, Sunnyvale, CA

Client: Atherton Place, LLC

Performed and managed geotechnical investigation, and provided earthwork and foundation observations and testing for this 85-lot single family residential subdivision. Unique site conditions included weak soils and low levels of contamination requiring reworking and burial. Project was completed under budget and within schedule.

Crossroads Subdivision, San Jose, CA

Client: Ryland Homes

Mr. Ferrone acted as project manager for a geologic hazards and geotechnical investigation for the residential subdivision. Approximately 125 acres of hilly terrain required assessment of earthquake faulting, landsliding, and soil stabilization. Detailed fill and cut slope designs and subdrainage were necessary to stabilize hillslopes. Mr. Ferrone worked closely with the City of San Jose to expedite issuance of permits.

Williamson Ranch Subdivision, Antioch, CA

Client: Kaufman & Broad of Northern California

Geotechnical investigation, construction observation and testing, and soil remediation for a 175-acre, 700 single-family home residential subdivision. Approximately 1.0 mc of soil was moved.

Northeast Ridge, Off-Site Improvement, San Bruno Mountain, Brisbane, CA

Client: Coscan Davidson Homes

Principal for earthwork observations, pavement recommendations, foundation construction, ground stabilization for a project consisting of rehabilitating Valley and part of North Hill Drive. Alternative pavement designs, including a new section, a deep lift section, and a subgrade soil improvement were presented.

Landslides and Slope Repairs**Landmark at The Ridge, San Bruno Mountain, Brisbane, CA**

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Monte Fiore and West Ridge Roads, Scotts Valley, CA

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Thomas Ranch, San Ramon, CA

Client: New Cities Development

Project manager and engineer for geotechnical and geologic investigations and landslide and slope stability investigations for developing approximately 136 lots and six estate lots over about 120 acres. Active and ancient landslides covered the hillslope, requiring approximately 25 landslides to be removed or stabilized. Cuts and fills up to about 45 feet deep were performed at the site. Mr. Ferrone acted as a consultant during the construction phase to assure that the surrounding hillslopes were adequately stabilized. Water bearing subsurface strata required extensive subdrainage systems.

Hillside Stabilization, Orinda, CA

Client: Confidential

Mr. Ferrone was the Geotechnical Engineer of Record for a hillside stabilization project in Orinda, California. The stabilization project was the result of the downslope creep and movement of a block of bedrock. Performed detailed geotechnical and geological investigations, detailed research, laboratory testing, both surface and subsurface monitoring, mapping, surveys, and slope stability evaluations to assess the impact the bedrock movement would have on upslope improvements. Detailed designs, plans, and construction specifications were developed in order to provide stabilization measures. Hillside stabilization measures primarily consisted of tied-back and drilled, cast-in-place caissons extending to depths of 35 feet. The caissons were connected with two rows of steel walers. The walers and caissons were pinned at the top using tie-backs extending to distances on the order of 80 feet. SFB provided a detailed inspection plan of the critical elements for the project, namely for the drilling and inspections of the caissons, tie-backs, and all earthwork. Inspection and testing was performed throughout the project, including logging and observing the drilling of all caissons, observing and pull-out testing of tie-backs, compaction observation and testing of all backfill, inspection of all surface drainage, and Special Inspection of concrete and steel construction. Provided progress reports and Final Construction Report to the owner during and after the completion construction.

Pescadero Creek Road Stabilization, San Mateo County, CA

Client: San Mateo County

A landslide damaged a portion of a county road in a mountainous area. The landslide destroyed one lane of the road and left a 100-foot long by 70-foot high steep scarp adjacent to a downslope residence. The engineering geology, geotechnical engineering, and storm water management services team was managed and supervised by Mr. Ferrone. The team performed a complete evaluation of the site to determine the cause of failure and develop a suitable repair scheme. The evaluation included geologic mapping, test borings, laboratory analyses, and geological and geotechnical engineering analyses. Five repair options including various combinations of grading, retaining walls, rock fill, reinforced fill slopes, soldier beams and tie backs, were developed for review. Cross-sections were developed to evaluate each possible repair scheme in relation to the site's geological framework. Construction cost estimates for each alternative were also prepared. Consultation meetings with the team and county officials led to the selection of a repair scheme. The final report focused on the selected repair method and providing geotechnical design and construction criteria. All work was performed in accordance with the county's required scope of work and time schedule.

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Slope and Seismic Stabilization-Buildings 51 and 77, Lawrence Berkeley Laboratory, Berkeley, CA

Client: Lawrence Berkeley National Laboratory

Mr. Ferrone managed and supervised geotechnical investigations for the design and construction of stabilization systems to prevent seismically induced slope instability of the slopes above Buildings 51 and 77 and thus, protect these two critical laboratory facilities. Subsurface conditions consisted of clayey fill materials overlying colluvium and/or weak bedrock of the Orinda and Moraga formations. The complex geology and site development history made 1) defining the slide limits, 2) identifying probable failure mechanisms, and 3) analyzing the slope stability challenging tasks. Mr. Ferrone's services were also retained for consultations during construction.

Emergency Response-Soil and Slope Stability Evaluation, Oakland & Berkeley Hills, CA

Client: Center For Public Resources (CPR)

Mr. Ferrone managed the evaluation of the geologic hazards, primarily erosion, debris flow and landslide potential, associated with the destruction of vegetation and existing wooden retaining walls as a result of the Oakland Hills fire in October 1991. Extensive literature and aerial photo review was performed. Provided unstable soil and rock potential map for entire burn area, an area comprising approximately 14,400 acres, delineating high, moderate, and low potential areas. Performed geologic hazard evaluations, including detailed geologic mapping, for over 1,100 parcels to determine areas which required immediate remedial measures. Conclusions and recommendations were presented for each parcel in written form.

Liberty Canyon Slope Repair, Agoura Hills, CA

Client: Harrison, Teaseley, Evans & Associates

Mr. Ferrone was project manager for geotechnical and geological exploration and stability analyses of historic and active landslides and erosion within condominium complex. Condominiums located at the crest and toe of a 70-foot high slope required detailed coordination efforts and difficult working conditions. Stabilization techniques included a mid-slope wall utilizing deep caisson support, soldier pile and lagging, soil nailing, shoring and extensive drainage of slope. The mid-slope varies between 10 to 30 feet high and is 1,400 feet long. Responsible for detailed mapping of 1500 foot long, 60 foot high unstable slope located between two condominium complexes, review of previous work performed by others, supervision of extensive subsurface exploration program including the monitoring of slope inclinometer casing, supervising detailed laboratory investigation to characterize soils and rock, supervising and performing extensive slope stability evaluation, and presenting written report describing results, conclusions and recommendations.

Wellesley Drive Open Space, Lafayette, CA

Responsible for detailed mapping and evaluation of potential landslide and debris flow hazards located within several drainage basins. Conclusions and recommendations were presented in report.

Redwood Road Slide, Oakland, CA

Responsible for the monitoring of landslide adjacent to and below Redwood Road. Provided recommendations and conclusions after each monitoring session. Performed stability evaluation of landslide and presented conclusions.

Open-Space Lands, Lafayette, CA

Client: City of Lafayette

An evaluation of steeply-sloping property encompassing approximately 600 acres was conducted by Mr. Ferrone in order to delineate the cause of debris flows and erosion affecting downslope property. Investigation included detailed engineering geology mapping, reconnaissance, literature review, and air photo interpretation.

Limeridge Hillside Stability Evaluation, Concord, CA

Responsible for the slope stability evaluation of hillside above Contra Costa Canal. Geologic mapping and monitoring of inclinometer casing was performed and conclusions and recommendations were presented.

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Residential Development, Santa Cruz County, CA

Client: Confidential

Provided emergency erosion control response at site located within Santa Cruz Mountains adjacent to sensitive terrain including wetlands areas. As much as 10 inches of rain fell on the 56 acre site within a 24 hour period. Performed reconnaissance to assess damage and to establish control of storm water flow. Created erosion control plan based upon results of existing conditions anticipated storm water flows, and regulatory agency requirements. Established erosion control inspection and maintenance schedule, and observed and directed implementation of erosion control plan. Established communication system between parties to efficiently install erosion control measures.

Thomas Ranch, San Ramon, CA

Client: New Cities Development

Project manager and engineer for geotechnical and geologic investigations and landslide and slope stability investigations for developing approximately 136 lots and six estate lots over about 120 acres. Active and ancient landslides covered the hillslope, requiring approximately 25 landslides to be removed or stabilized. Cuts and fills up to about 45 feet deep were performed at the site. Mr. Ferrone acted as a consultant during the construction phase to assure that the surrounding hillslopes were adequately stabilized. Water bearing subsurface strata required extensive subdrainage systems.

Rubino Property Residential Development, San Jose, CA

Client: Kaufman and Broad, South Bay

Mr. Ferrone managed and performed geotechnical investigations and provided consultations for a single-family residential subdivision. The investigations were focused on stabilizing subsurface soils and providing design and construction criteria for residential foundations. Appurtenant structures, including bridges, roadways and surface drainage structures were analyzed and appropriate design and construction criteria were provided. Adjacent 50-foot, near-vertical river banks were evaluated and stabilization schemes were presented by Mr. Ferrone.

Hostetter Road Subdivision, San Jose, CA

Client: Greystone Homes

Mr. Ferrone managed and performed fault rupture hazard and geotechnical investigations for this 80-lot residential development. Due to time constraints, the work was performed within a compressed schedule and under budget in order for the owner to acquire permits in a timely manner. Development issues included zero lot lines, residential structures on three sides of the subdivision, earthquake faulting, highly expansive clays, and unstable subgrade. Mr. Ferrone provided construction observation, testing, and consultation services to expedite the construction phase of the project.

Carroll Street Housing, Sunnyvale, CA

Client: Mid-Peninsula Housing Coalition

Performed a geotechnical investigation to construct a 127-unit, two-to three-story, wood-framed structure with adjoining courtyards. Paved parking and access were also provided. Recommendations included stabilizing the underlying weak soils to prevent damaging differential settlements, and alternative foundation systems due to the zero-lot line.

Baker Park Housing, San Jose, CA

Client: Mid-Peninsula Housing Coalition

Geotechnical investigation for low cost, public housing complex. The investigation included foundation recommendations for fifteen detached structures, two-to three-stories in height, housing two, twelve, or sixteen living units. Recommendations included stabilizing weak and potentially compressible soils below foundations.

Subdivision 7171, Alamo, CA

Responsible for performing detailed mapping of proposed subdivision site within steep hillsides, including logging of backhoe excavations. Evaluation and interpretation of aerial photographs and published and unpublished literature on the site and vicinity was also performed. Responsible for presenting results, conclusion and recommendations in written report form.

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Pioneer Heights Housing, Hayward, CA

Client: State of California

Responsible for logging excavated trenches to evaluate the locations of active or potentially active traces of the Hayward fault. Prepared written report describing conclusions and recommendations. Responsible for performing stability analysis of surrounding slopes and providing written conclusions and recommendations.

Linda Vista III, Daly City, CA

Responsible for detailed mapping of proposed residential development site and providing stability analysis including subsurface exploration. Review of literature was performed. Written conclusions and recommendations were provided.

Gateway Residential Development, Vallejo, CA

Responsible for performing subsurface exploration and geologic mapping of features, including evaluation of existing deep-seated landslides. Soil and rock characterization utilizing seismic refraction techniques was also performed for the subsurface program.

Thomas Avenue Residential Development, Brisbane, CA

Responsible for the geologic mapping and slope stability evaluation of hillside site where landslides surround the development site. Supervision of subsurface exploration and laboratory investigation was performed. Conclusions and recommendations were presented in written form.

Underwood Apartments, Oakland, CA

Responsible for evaluating slope stability of hillside below apartment complex, geologic mapping and mapping of stress related features, conclusions and recommendations in written form.

Tara Hills Subdivision, Richmond, CA

Evaluated the geologic hazards at subdivision site. Performed deterministic seismicity evaluation to determine effects of liquefaction and differential compaction potential. Provided conclusions and recommendations in report.

Linda Vista Subdivision, Fremont, CA

Responsible for the evaluation of hillside stability surrounding proposed development. Evaluation of hillside drainage was performed. Conclusions and recommendations were presented in written form.

Clay Street Condominiums, San Francisco, CA

Responsible for the investigation of hillside site for high rise structure. Performed extensive field investigation including mapping, exploratory borings, seismic refraction traverses, and review of published and unpublished data on the site. Supervised laboratory investigation to characterize the rock mass. Provided extensive conclusions and recommendations in written form.

Residential Development, Antioch, CA

Fault location investigation performed for residential development. Over 2000 linear feet of trench was excavated in over consolidated alluvium and rock to depths of 5 to 18 feet. Water was encountered at shallow depths. Work was performed during both winter and summer months. Comprehensive review of published and unpublished information concerning the site and Antioch fault was summarized and presented in report form. Detailed recommendations and conclusions regarding fault location and set-back criteria were presented.

Ten Lot Subdivision, Danville, CA

A geologic hazard investigation of steeply sloping hills was conducted for a proposed ten lot subdivision. Geologic mapping was performed and a resulting slope stability map prepared. A report outlining our recommendations was the final work product.

Green Valley Highlands, Watsonville

Responsible for evaluating stability of subdivision site. Performed subsurface exploration, laboratory investigation and detailed stability analysis. Provided conclusions and recommendations in report. Subsurface conditions included highly compressible peat and mud layers resulting from pre-existing marshes and bogs.

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Carroll Street Housing, Sunnyvale, CA

Performed a geotechnical investigation to construct a 127-unit, two –to three-story, wood-framed structure with adjoining courtyards. Paved parking and access were also provided. Recommendations included stabilizing the underlying weak soils to prevent damaging differential settlements, and alternative foundation systems due to the zero-lot line.

Baker Park Housing, San Jose, CA

Geotechnical investigation for low cost, public housing complex. The investigation included foundation recommendations for fifteen detached structures, two-to three-stories in height, housing two, twelve, or sixteen living units. Recommendations included stabilizing weak and potentially compressible soils below foundations.

Park Manor G.I., Morgan Hill, CA

Project engineer for the geotechnical design of a residential subdivision consisting of thirty-five to 2-story private residences with appurtenant roadways. Minor grading will be performed to develop the site.

Los Robles Residential, Palo Alto, CA

Project engineer on geotechnical design and investigation for residential multi-unit residential site. The project will consist of constructing 34 town homes which will have two stories of living area over a first-floor garage. The site encompasses approximately 1.64 acres (total).

ISK Residential Site, Sunnyvale, CA

Project engineer for geotechnical design and investigation on the site which will be developed for either 65 townhomes or for an approximately 95,000 square foot, two-story office structure. The site currently houses approximately 70,000 square feet of outdated office and laboratory facilities which will be demolished as part of the project; except for the existing PG&E towers and transmission lines.

Hostetter Road Subdivision, San Jose, CA

Project engineer for erosion control monitoring during winter grading at this residential subdivision. Tasks included plan review, recommendations for the design and construction of pavement curb and gutter and associated sidewalks, recommendations regarding free-draining gravel below post-tensioned slab foundations, fault zone location recommendations, and earthwork construction observation and testing services and backfill, and the influence of an adjacent 30-foot high embankment. Subsurface materials encountered included soft to firm silts and clays and loose fine-grained sands.

Hospitals**Ambulatory Services Center, Children's Hospital, Oakland, CA**

Client: Children's Hospital Oakland

Mr. Ferrone managed and supervised the geotechnical investigation for a five-story structure with a below-grade basement level requiring a 21-foot deep excavation. The building is located directly adjacent to an existing multi-level parking structure which required underpinning of the foundation to permit the new construction. Subsurface conditions consisted of stiff silty and sandy clays and relatively high ground water levels. Recommendations were provided for temporary shoring, underpinning, and dewatering, below-grade walls, permanent dewatering systems, and foundations. Primary considerations for foundation design were: 1) the potential for relatively high ground water levels, and 2) the existing parking garage, adjacent structures, and other improvements which are located in close proximity to the proposed Ambulatory Services Center building.

Patient Services Pavilion-Children's Hospital, Oakland, CA

Client: Children's Hospital Oakland

Mr. Ferrone managed a geotechnical investigation, and geologic hazard and seismic response studies for a building at Children's Hospital in Oakland. The Phase I portion of the project consisted of a new irregular shaped, four-to five-story building with an additional basement level located approximately 10 feet below grade. Wings A and B of the existing hospital complex were demolished prior to construction of the new

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building. Portions of the eastern wall of the new structure were located directly adjacent to and below the foundation of and existing CALTRANS retaining wall for the Highway 24 embankment. In addition, a 120 by 180-foot courtyard area with a chapel structure and a perimeter covered walkway structure were located adjacent to the west side of the new structure. Moderate grading consisting of excavations to depths of 12 to 15 feet were performed to develop the project site for the building.

Hayward Medical Center, Hayward, CA

Client: Hayward Medical Center

Foundation investigation for a medical office building addition, four level parking structure and pedestrian bridge over adjacent city street. Subsurface conditions consisted of highly expansive surficial clays over slightly compressible clays, silts interbedded with sands. Recommendations for continuous strip footings and friction piles and caissons provided.

Delta Memorial Hospital, Antioch, CA

Client: Delta Memorial Hospital

Mr. Ferrone performed geologic hazard evaluation and geotechnical investigation for the new hospital. Subsurface conditions included critically expansive surficial clay. Recommendations for shallow foundation support and alternative to mitigate potential problems resulting from the expansive clay were provided

Seton Medical Center, Daly City, CA

Client: MDA Engineering

Project manager for a seismic site response study. Provided deterministic and probabilistic ground motions for the structural design of the medical center. Analyses included evaluating the local and regional seismic environment. Permitting was approved based on Mr. Ferrone's study.

Kaiser Permanente Medical Facility, Fremont, CA

Geotechnical investigation and geologic hazard evaluation for a proposed 2-story medical office building. Recommendations regarding foundation design criteria, flexible pavement sections and earthwork were provided. Evaluations of potential geologic hazards were noted.

Mount Diablo Medical Center, Concord, CA

Geotechnical and geologic hazard investigation for improvements to existing facility, including new oncology departments and tower. Design criteria for utilizing existing foundation with new caisson foundation, enlarging existing basement and construction techniques such as dewatering and subgrade stabilization.

Military**Child Development Center, Point Loma, San Diego, CA**

Client: U.S. Navy, Western Division Facilities Engineering

Responsible for performing slope stability evaluation of site and surrounding hillsides. Detailed mapping, literature review and subsurface exploration was performed. Responsible for conclusions and recommendations presented in written report. Responsible for peer review of subsequent stabilization methods for hillsides.

Oak Knoll Naval Regional Medical Center, Oakland, CA

Client: U.S. Navy, Western Division Facilities Engineering

Project geotechnical engineer for the design and construction of earthwork and foundation systems for several additions to regional medical center.

Naval Housing Facilities, San Diego Naval Station, San Diego, CA

Client: U.S. Navy, Western Division Facilities Engineering

Geotechnical engineer for the design and construction of several multi-story, temporary housing facilities and lodges.

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Naval Housing Facilities, Alameda Naval Air Station, Alameda, CA

Client: U.S. Navy, Western Division Facilities Engineering

Project geotechnical engineer for the design and construction of multi-story, temporary housing facilities utilizing pile foundation systems.

Port Hueneme/Point Mugu Naval Weapons Air Station, Oxnard, CA

Client: U.S. Navy, Western Division Facilities Engineering

Geotechnical engineer for the design and construction of family services center and multi-story temporary housing buildings.

Housing and Children's Facility, Point Loma Naval Station, San Diego, CA

Client: U.S. Navy, Western Division Facilities Engineering

Geotechnical engineer and geologist for the design and construction of a multi-story, multi-purpose building.

Child Development Center, Point Loma, San Diego, CA

Client: U.S. Navy, Western Division Facilities Engineering

Responsible for performing slope stability evaluation of site and surrounding hillsides. Detailed mapping, literature review and subsurface exploration was performed. Responsible for conclusions and recommendations presented in written report. Responsible for peer review of subsequent

Building 87 Roadway, Concord Naval Weapons Station, Concord, CA

Client: U.S. Navy, Western Division Facilities Engineering

Mr. Ferrone performed a geotechnical investigation for an access road with a length of about 2,000 feet of roadway, 20 feet wide, with 3-foot wide shoulders. Grading to construct the road consisted of cuts and fills of up to 10 and 7 ½ feet, respectively. A grade change of about 150 feet occurred along the alignment. The area was found to have several landslides and unstable areas requiring repairs. Review of geological and geotechnical literature, interpretation of stereographic aerial photographs, reconnaissance, drilling exploratory borings, detailed evaluation and analyses of accumulated data, and report submittal were performed. Considerations for the design and construction of the project included slope stability, unstable material near the Clayton fault, saturated condition of surface soils, and subdrainage. Detailed earthwork and pavement design and construction criteria were provided by Mr. Ferrone.

Pile Foundation Supported Structures**Bay Meadows Hotel, San Mateo, CA**

Mr. Ferrone acted as project manager for the geotechnical aspects of the design and construction of a new hotel. The site is located along the Bay margins and is underlain by artificial fill material over Bay Mud with varying degrees of consolidation and varying thickness. Total and differential settlements were a major concern as well as bracing and excavations in the Bay Mud. The project included a premier hotel with a 5-story concrete parking structure. The structures were supported on deep foundations due to high building loads. Lateral resistance due to seismic shaking was a primary consideration during design.

Kaiser Parking Structure and Medical Office Building, Redwood City, CA

Mr. Ferrone was in charge of performing a geotechnical investigation and observation and testing during construction of a 7-story concrete parking structure interconnected with a 4-story steel-framed office building. Challenges included compressible soil, expansive soil, heavily loaded parking structure and lightly loaded office building, and total and differential settlements due to interconnection. Piles support was required.

Oyster Point Redevelopment, San Francisco, CA

Mr. Ferrone was the design Geotechnical Engineer for a major planned project at Oyster Point. Oyster Point, located along the western side of the San Francisco Bay and underlain by up to 30 feet of garbage fill and up to 100 feet to soft, compressible Bay Mud, required the use of piles to support several buildings, including mid-rise office and hotel buildings. The varying depth and consistency of the Bay Mud, the varying thickness and unknown components of the garbage fill, as well as the need for detailed seismic parameters were the primary

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foundation concerns. Ultimately, a deep, steel H-beam foundation was to be implemented with flexible utility systems.

Harrison Hotel Seismic Upgrade, Oakland, CA

Mr. Ferrone Supervised the geotechnical investigation for the seismic upgrade of this early 20th century, masonry, 5-story building with one below grade level. Challenging aspects included low overhead clearance for drilled pier installation in the saturated sandy soils.

YWCA Facility, Oakland, CA

Mr. Ferrone was the project's Geotechnical Engineer and was responsible for performing a geotechnical investigation for the proposed seismic rehabilitation of an existing steel-frame five-story structure with a partial basement constructed circa 1916. The seismic rehabilitation of the existing building consisted of the installation of additional steel-frames in the upper floors and concrete shear walls in the basement. The primary consideration for the foundation aspects of the seismic rehabilitation design were the loose sandy fills. A drilled pier foundation system was recommended for the retrofit. Shallow ground water conditions and low-overhead clearance made installation conditions very difficult.

Commercial/Office Buildings**U.S. Mint, San Francisco, CA**

Client: U.S. Mint, Washington D.C.

Mr. Ferrone was the Project Geotechnical Engineer and manager for the geotechnical investigations and preparation of plans and specifications for slope stabilization of 10 acres of hillsides surrounding the U.S. Mint in San Francisco. Remediation measures included active and passive anchored rock mesh, debris catchment walls, anchored and sculpted concrete buttresses, anchored erosion control blankets, new vegetation and irrigation systems, and a new emergency egress pathway with retaining walls. Assisted U.S. Mint in construction bid process and phasing of work. Provided all construction observation monitoring, testing, and inspections. Worked directly to US Mint for all phases of work.

Point Richmond Technology Center II, Richmond, CA

As project Geotechnical Engineer, Mr. Ferrone performed both a feasibility and geotechnical investigation for a technology center. The project consisted of a rectangular, 2-story, wood/steel-frame building with an interior courtyard. The building also included parking and access surrounding the building and a truck loading dock. The site is underlain by weak and highly compressible Bay Mud of variable depths, weak and potentially compressible near-surface soils, and high expansion potential of the clayey near-surface soils. To minimize potentially damaging settlements, three different foundation systems were considered including: 1) a rigid grid foundation system, 2) structural slab foundation and 3) a deep pile foundation. Surcharging recommendations were given for the shallow foundation alternatives. Pile foundations were ultimately selected and Mr. Ferrone provided all necessary geotechnical design and construction criteria for the pile foundation system. Seismic evaluation of the pile system was also performed.

McCandless Towers, Santa Clara, CA

Client: McCandless Companies

The project included an 11-story tower. Value engineering for the foundation design of the tower was performed by the design team. Mr. Ferrone's team performed a geotechnical engineering evaluation that included the following scope of work: 1) a detailed review of previous work including our investigation studies and our construction observation records, 2) review of current practice for the design and construction of pile foundations systems based on the results of our past studies and construction observation records, 3) an evaluation of the site's seismic environment based upon recent research and current earthquake engineering techniques, use of current attenuation relations that included recent earthquakes, computer analyses to determine the spectral acceleration based on previous earthquake recordings on similar site soils, 4) preparation of a smoothed design site response spectra for earthquakes with probabilities of occurrence of 10 percent in 100 years and 10 and 50 percent in 50 years, 5) preparation of reports presenting the results of our foundation design review and our updated seismic site response study, and 6) consultation with the design team.

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Pacific Renaissance Plaza, Oakland, CA

Client: Perini Corporation for Pacific Renaissance Associates II

Construction of a 6-to 15-story commercial and residential structure with three levels of underground parking adjacent to underground BART tubes. The project site, located in downtown Oakland, was surrounded by at-grade city streets and low-to high-rise buildings requiring stability and settlement analyses and stabilization schemes to assure movement of existing structures would not occur. Building site was underlain by loose to dense Merritt sand and had high ground water conditions. Recommendations and conclusions regarding excavation shoring design criteria, dewatering, below grade wall design criteria, and mat foundation support were provided. Mr. Ferrone managed the design phase of the project, and designed and installed monitoring equipment during the construction phase.

PG&E Liquefaction Evaluation, Fremont, CA

Client: Degenkolb Engineers

Project manager on geologic hazards and soil stabilization study. The project consisted of seismically retrofitting existing buildings. The purpose of the investigation was to evaluate the liquefaction potential and dynamic densification potential of the foundation soils below the buildings.

Providian Campus Extension, Pleasanton, CA

Client: The Edward Pike Company

Acting as project engineer, Mr. Ferrone performed a geotechnical investigation for two 2-story buildings; one with a 20,000 square foot footprint and the other with 30,000 square foot footprint. The improvements included landscaped areas, a plaza and water features. The resulting report included recommendations for the design and construction of the project on the highly to critically expansive site. Criteria for the design of earthwork, footing foundations, slabs-on-grade, retaining walls, and pavement were provided in the report.

Jackson Amador Shopping Center, Hayward, CA

Client: Capital & Counties USA, Inc.

Project engineer for geologic hazards studies and geotechnical investigations for the shopping center. The purpose of the investigations was to evaluate the foundation soils and to provide recommendations concerning the geotechnical engineering aspects of the project. Mr. Ferrone provided timely recommendations during the design phase so that the project was able to be constructed ahead of schedule under extreme time constraints.

Center for Science and Environmental Education, Oakland Zoo, Oakland, CA

Client: Oakland Zoo

Project manager for geotechnical and geological investigations for this educational center. The project included fault rupture hazard studies requiring subsurface trenching, logging, and mapping. He worked closely with the owner to provide very cost-effective investigations.

Dey Labs New Distribution Warehouse and Office Addition, Napa, CA

Client: Dey Laboratories

As project engineer, Mr. Ferrone performed a geotechnical investigation and provided detailed design criteria for a new 50,000 square foot distribution warehouse, including an elevated truck dock and associated truck access drives. Design criteria for underground utility construction was also provided. Mr. Ferrone later managed concrete testing and observation for the project.

Safeway Office Building Complex, Walnut Creek, CA

Client: Safeway, Inc.

Project engineer for this feasibility evaluation to provide a preliminary evaluation of the foundation soils and to determine the suitability of the site for future development. The project included developing a parcel for office buildings.

New Dairy Facility, Hayward, CA

Client: Edward A. Bonelli & Associates

Mr. Ferrone acted as project manager. The project included a single-story, dock high building with tilt-up wall panels above the floor slab, and 30,000 to 60,000 gallon tanks, with four of the tanks approximately 70 feet

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high. A truck shop and appurtenant truck docks and pavement were also a part of the project. A geotechnical investigation was performed for the purpose of providing design and construction criteria for site earthwork, foundations, slab-on-grade floors, dock-high retaining walls, and flexible asphalt and rigid concrete pavements. The primary considerations for design were weak, heterogeneous, and potentially compressible fill, and the expansion potential of the more clayey near-surface materials. The soil conditions required the assessment of deep foundation systems and the surrounding seismic environment.

Los Altos Pharmacy, Santa Clara, CA

Client: The Freeman Group

Mr. Ferrone supervised a geotechnical investigation for the seismic retrofitting and renovation of an existing pharmacy building. An evaluation of shallow and deep foundation systems was performed, including providing capacities for existing and new foundations.

Britannia Business Center, Pleasanton, CA

Client: The Edward Pike Company

The project consisted of constructing two-story to four-story structures. Mr. Ferrone managed and performed Geotechnical investigations and determined that weak and unstable subgrade conditions and the high to critical expansion potential of the clayey soils encountered in the upper four to five feet were the primary considerations for design. Mr. Ferrone provided design and construction criteria in report form that addressed earthwork and foundations. He acted as a consultant during the construction phase of the various projects.

Shen Infiniti Building, Redwood City, CA

Client: Acubuild

As project engineer, Mr. Ferrone performed a scope of work that included a review of published and unpublished geotechnical and geologic information, a review of previous geotechnical work at the site, a site reconnaissance, subsurface exploration, laboratory testing, engineering analysis of the field and laboratory data, and preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for site earthwork, building foundations, and slab-on-grade floors. The project consisted of removing an existing building and building a new 20,000 square foot building in its place. Since the site is underlain by weak and highly compressible Bay Mud, a detailed settlement evaluation was performed to determine if shallow or deep foundations were applicable for the building. Based on the Bay Mud characteristics, Mr. Ferrone was able to determine that shallow foundations could be used, eliminating the need for expensive deep foundations.

Safeway Distribution Facility, Tracy, CA

Client: Safeway, Inc.

Design engineer for construction of a large, multi-phased warehouse distribution facility with associated pavements. Subsurface conditions consisted of interbedded silts, clays and gravels. Recommendations and conclusions regarding geologic hazards, foundation design criteria, flexible and rigid pavement sections, and dock-high retaining walls were provided.

Montclair East Addition, Montclair, CA

Client: Upside Associates

Fault location study for site within Hayward Fault Special Studies Zone. In-depth research of previous work performed in the immediate area and subsurface exploration, including exploratory trenching and borings, were conducted. Recommendations concerning probable location of fault rupture and potential for seismic shaking were provided. Limited access and time frame requirements existed.

Home Depot, Brisbane, CA

Client: Home Depot

Responsible for detailed mapping of proposed Home depot site and providing stability analysis including subsurface exploration. Review of literature was performed. Written conclusions and recommendations were provided.

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Japanese Cultural Center, Gilroy, CA

Responsible for logging of trenches excavated to evaluate potential traces of the Calaveras fault. Aided in the development of geologic map of the site.

Addison-Wesley Publishing Expansion, Sand Hill Commons, Menlo Park, CA

Responsible for geologic mapping of features to evaluate the soil and bedrock conditions. Logging of trenches performed. Detailed geologic map constructed. Conclusions and recommendations presented in written report.

Pankow Site Evaluation, Livermore, CA

Responsible for geologic reconnaissance and mapping, literature review, review of work performed by others, aerial photograph analysis and trench logging to investigate if active or potentially active traces of the Greenville fault or related faults underlie proposed site. Responsible for the evaluation of the data collected and written report to provide conclusions and recommendations.

Pankow Casting Yard, Livermore, CA

Fault rupture hazard investigation for proposed casting yard. Site located within Alquist-Priolo Special Studies Zone for Greenville fault. Four exploratory trenches totaling approximately 970 linear feet were excavated to determine limits of Greenville fault zone within site. Recommendation and conclusions were provided.

Montclair East Addition, Montclair, CA

Fault location study for site within Hayward Fault Special Studies Zone. In-depth research of previous work performed in the immediate area and subsurface exploration, including exploratory trenching and borings, were conducted. Recommendations concerning probable location of fault rupture and potential for seismic shaking were provided. Limited access and time frame requirements existed.

Home Furnishing Center, Fremont, CA

Pavement evaluation for existing commercial facility. Project site is underlain by soft, highly expansive clays. Recommendations and conclusions regarding mitigation procedures were provided.

Rainbow Center, Oakley, CA

A shopping center, comprised of 9 structures and associated loading docks, and extensive car and truck parking was constructed on a site underlain by 7 to 25 feet of dune sand. Cuts and fills of about 5 to 10 feet were required to achieve building pad grades. Recommendations regarding shallow foundation design criteria, and flexible pavement sections were provided.

Sand Hill Commons, Palo Alto, CA

Design and construction of a 2-story tilt-up structure with associated parking. Subsurface conditions consisted of non-expansive sandstone and critically expansive claystone bedrock. Mitigation of the effects of the dissimilar bedrock materials included reworking. Subsurface exploration for the project included trenching.

Safeway Office Building Complex, Walnut Creek, CA

Project Engineer. Performed a feasibility evaluation in order to provide a preliminary evaluation of the foundation soils, and determine the suitability of the site for future development. The project included developing a parcel for office buildings. Appurtenant access roads, driveways, and parking lots was also included in the development. The scope of work included a detailed review of existing published and unpublished reports and maps, a site reconnaissance, engineering analyses of the field and laboratory data including a liquefaction evaluation, and preparation of reports.

Animal Rescue Facility (ARF), Shadelands, Walnut Creek, CA

Project engineer for a geotechnical feasibility investigation on the project which may consist of removing several existing buildings and constructing a 26,000 square foot building for the ARF Facility existing parking lot and roadway will be incorporated into the development. An entry way and drop-off circle will also be constructed. Minimal grading is anticipated to be required to develop the site.

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Safeway Store # 1502, Pleasanton, CA

Project Engineer for plan review and pre/post construction consultation for low-rise building. Recommendations were made for a system of subdrains behind the truck dock retaining walls.

Intel/Mebes Project, Santa Clara, CA

Project manager for geotechnical design and seismic response study for a medium-rise building. The project will include a 50-by 50-foot addition to the south side of the existing Intel building. The addition will be a one story-braced frame structure with interstitial space. Preliminary foundation loads are 63 and 33 kips (dead plus live).

Business Center, Pleasanton, CA

The project consisted of constructing a 2-story, concrete tilt-up structure with plan area of about 67,500 square feet. In addition, asphalt pave parking for 238 autos was included. Performed a geotechnical investigation and determined that weak and unstable subgrade conditions and the high to critical expansion potential of the clayey encountered in the upper four to five feet were the primary consideration for design. Provided design and construction criteria in reform that addressed earthwork and foundations.

Retail Development, Larkspur, CA

A 2-story retail development was constructed on a site underlain by fill and soft compressible Bay Mud extending to depths of 60 feet. Recommendations and conclusions regarding liquefaction, dewatering, structural floor slabs, and pile foundations were provided.

Technology Park, Santa Clara, CA

Construction of a 1-story research and development structure with a basement extending about 18 feet below grade. Project also includes a partially below grade tank farm. Subsurface conditions at the site consisted of alluvial soils including critically expansive clays. Recommendations and conclusions regarding mitigation of the affects of critically expansive clays, foundation design criteria, below grade walls and rigid mat floors were provided.

Detention Basins/Reservoirs/Treatment Plants**Seaside Highlands, Marina, CA**

Performed geotechnical investigation for 3 basins to determine percolation/infiltration rate of storm water into the native soils, and to provide grading/excavation design and construction criteria for pond bottoms and embankments. Geotechnical design and construction criteria also provided for outfall structures and pedestrian bridges.

Recharge Facility, Scotts Valley, CA

Client: Scotts Valley Water District

Performed geological & geotechnical review and investigation for site for use as a groundwater recharge facility. The facility included a 14,000 square foot treatment plant and two storage basins. The facility was located at the toe of former quarry slopes and required detailed slope stability analyses evaluations. Work included literature and air photo review, field reconnaissance and mapping, review of pervious boring and pits logs, engineering analyses, and reporting.

Skylawn Reservoir, San Mateo County, CA

Client: Skylawn Corp.

Mr. Ferrone managed and supervised a Harza team that performed detailed engineering geology and geotechnical engineering investigations and analyses to evaluate the stability of an existing reservoir's earthen embankments, both statically and during earthquake loading. The reservoir, located along a 1,000-foot high ridgeline with a major active fault located at the base of the ridge, was affected by unstable slopes on its east side. The investigation required intensive literature review, air photo review, mapping, and discussions with local and regional geologists. Exploratory drilling, including nearly continuous coring, was also performed to assess and characterize subsurface geology and soil/rock strength profiles. Laboratory testing was performed

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by Mr. Ferrone's team based upon the testing program developed by the team. Embankment and slope stability were assessed under various reservoir and earthquake loads, and a risk assessment was performed. Rehabilitation measures were recommended and implemented based on the results of the field and office work. Monitoring of the embankments of the rehabilitated reservoir was performed, using piezometers and inclinometers to assess the embankment performance. All work was performed within the lump sum contracts and within the anticipated time frames; no revisions were made to the contract during the project.

New Green Valley Water Treatment Plant, Vallejo, CA

Client: Carollo Engineers for the City of Vallejo

Project manager for geologic hazards study, earthwork observations, and inspection services for this wastewater treatment plant. The facility is located at the northern terminus of Green Valley Road in Vallejo, California. The facility includes a below-grade clearwell/pump station, an at-grade plant building, a residual processing reservoir, and a water tank reservoir. Appurtenant access roadways and pipelines are included. Cuts of about 15 to 20 feet deep were performed for the clearwell, residual facility, and access road. Excavations up to about 40 feet were performed for the new reservoir.

Water Tank IV-Assessment District #27, Antioch CA

Client: McGill, Martin, Self

Project manager for geotechnical investigation for constructing concrete, water storage tanks located on a 500-foot high, narrow ridge top. The initially constructed tank has a capacity of 1.7 million gallons. Another tank of similar size was also constructed. Open-cut excavations on the order of 30 to 50 feet were required to construct the tanks. The tanks are circular in shape, each with an inside diameter of about 115 feet, and vertical concrete side walls. Cut slopes, inclined at 3:1 (horizontal to vertical) and 30 feet high and extended upward from the tanks. The slope on one side of the tank was cut approximately 30 feet to allow a roadway and a 16-inch pipeline access to the tanks. Mr. Ferrone provided recommendations for the stabilization of the ridgeline slopes and access road slopes. Seismic site response studies were also performed.

Napa Waste Water Treatment Plant Expansion, Napa, CA

Client: Carollo Engineers

Project manager for geotechnical investigation for the expansion of the Napa Waste Water Treatment Plant which included a 10-million gallon Reclaimed Water Storage Reservoir and a 60,000-gallon Ballast Pond. A series of slope stability analyses were performed for both embankments for various design conditions. Various slope protection alternatives were investigated in order to optimize the slope inclination of the Reclaimed Water Storage Reservoir. The Ballast Pond was located in an area which was underlain by weak, highly compressible Bay Mud deposits. Development of the Ballast Pond required a staged construction of a surcharge fill to precompress the soft foundation soils prior to final construction of the pond. Recommendations for design and construction of these improvements were provided in a detailed geotechnical investigation report.

Dublin Reservoir Sites, Dublin, CA

Client: Winzler & Kelly

Project manager for a geotechnical investigation and geologic hazard study for this reservoir. Three different sites are being considered for a proposed reservoir. The sites are all located within a Zone 2 area.

Tassajara Reservoir, Alameda County, CA

Responsible for detailed mapping of proposed reservoir site and providing stability analysis including subsurface exploration. Review of literature was performed. Written conclusions and recommendations were provided.

Water Reservoir, Empire Mine Road, Antioch, CA

Responsible for performing detailed geologic mapping of site and vicinity, review of aerial photographs, literature review, supervising subsurface exploration program and laboratory investigation, performing slope stability evaluation, review of previous geologic work performed by others at the site. Responsible for presenting results, conclusions and recommendations in written report.

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Clover Creek Facilities, Water Treatment Plant, Sequoia National Park, CA

Responsible for evaluating the excavation characteristics of soil and rock at site. Rock mass evaluation was performed utilizing subsurface exploration techniques and seismic refraction equipment. Stability of hillsides was performed. Conclusions and recommendations were presented in written report.

Crestmore Canyon Detention Basin, San Bruno, CA

Responsible for the stability evaluation of proposed spillway foundations and walls, embankment slopes, and the surrounding hillsides. Performed geologic mapping and subsurface exploration. Supervised laboratory investigation. Aided in the development of conclusions and recommendations for written report.

Tri-Dam Project, Pinecrest, CA

Safety inspection of hydroelectric power generation facilities and a 320-foot high, double-curvature concrete arch dam (Donnells Dam); a 280-foot high zoned earthfill dam (Beardsley Dam); and a 190-foot high, 1900-foot long concrete gravity dam (Tulloch Dam).

San Mateo Wastewater Treatment Facility, San Mateo, CA

Performed a geotechnical investigation for the design and construction of additions to an existing wastewater treatment facility. Subsurface conditions included fill overlying highly compressible Bay Mud. Our scopes of services included design of foundation types and determination of settlement potential. Pavement designs were analyzed and various alternatives were recommended.

Crestmore Canyon Detention Basin, San Bruno, CA

Geotechnical investigation for proposed embankment and spillway on a site underlain by clay, sand, silt and fill. Subsurface exploration included test pit excavations. Recommendations and conclusions regarding location and support of embankment were provided.

San Catanio Creek Drop Structures, San Ramon, CA

Geotechnical investigation for flow control structures. Subsurface conditions consisted of sand and gravel. Recommendations and conclusions regarding location. Placement and construction of structures were provided.

Campuses and Schools**Parker School, Oakland, CA**

Client: Oakland Unified School District

A detailed slope stability evaluation was performed by Mr. Ferrone for Parker School, located at the toe of a previously-mapped, ancient landslide that is crossed by numerous mapped strands of a major active fault. Literature review, air photo analysis, and geologic mapping were performed by Mr. Ferrone's engineering geology and geotechnical engineering team. The team developed a subsurface investigation program to assess the depth and nature of the ancient landslide using drilling and instrumentation techniques. Laboratory testing was performed on selected samples to assess strength characteristics. Slope stability analyses, including static and earthquake loading, were performed to model several probable geologic conditions. A report summarizing the results of the investigation, including Harza's conclusions regarding the stability of the slope, was submitted at the end.

25-Yard Laney College Pool, Oakland, CA

Client: Paul F. Fratessa Associates, Inc.

Mr. Ferrone supervised and managed geotechnical investigation for the replacement of a pool located on the Laney College campus in Oakland. The pool was replaced because of extensive damage caused by the 1989 Loma Preata earthquake. Two alternative replacement plans were considered. Stabilization and ground modification was required to mitigate the damage.

Kenneth C. Ferrone

Principal Geotechnical Engineer & Engineering Geologist, President

Las Positas College Improvements, Livermore, CA

Client: Cometta/Cianfichi Architects

Project manager for geotechnical investigation, geotechnical design and geologic hazard study for site improvements consisting of the grading of approximately 150 acres, construction of approximately 8,000 linear feet of new roadways, site utilities including a new storm drain and associated inlet and outlet structures, new retaining walls, new concrete masonry walls, and a Central Utility Building. Three new bridges also were included over an alluvial channel which borders the northwest side of the site. A new storm drain will be constructed on the northwest side of the site in the location of an existing alluvial channel. Excavations on the order of 12 feet or more may be required to construct portions of the storm drain system. Major grading will be performed for the development with fills up to 40 feet deep and cuts up to 25 feet. Future development in the graded areas of the site may include service buildings, sports fields, bleachers, and basketball and tennis courts.

Various School Sites, San Francisco Bay Region, CA

Client: Various

Mr. Ferrone manages and supervises geologic hazard studies and geotechnical investigations for school sites within the San Francisco Bay Region. Mr. Ferrone has personally been involved with over 60 geologic hazard assessment projects for schools. The studies and investigations have included aerial photo analyses; literature, report, and map reviews; site reconnaissance and mapping; discussion with regulatory staff; subsurface investigations; laboratory testing and report preparation. Reports include geologic hazard assessments such as determining the potential for liquefaction, landsliding, lateral spreading, settlement, fault rupture, earthquake shaking, flooding, and inundation due to dam failure. Mitigation methods are often presented, including foundation design and construction criteria as needed.

Pioneer Heights at California State University Campus, Hayward, CA

Client: California State University at Hayward

Mr. Ferrone managed and performed geotechnical and fault location investigation for student housing on the CSU Campus in Hayward. The project consisted of six three-story, and one single-story wood-frame apartment buildings, a single story community building, a maintenance building, and a parking area. The site had maximum plan dimensions of approximately 500 by 630 feet and was located within a mapped fault area.

Center for Science and Environmental Education, Oakland Zoo, Oakland, CA

Client: Oakland Zoo

Project manager for geotechnical and geological investigations for this educational center. The project included fault rupture hazard studies requiring subsurface trenching, logging, and mapping. He worked closely with the owner to provide very cost-effective investigations.

Antioch High School, Antioch, CA

Responsible for geologic reconnaissance and mapping, literature review, aerial photograph analysis and trench logging to investigate if active or potentially active traces of the Antioch fault or related faults underlie proposed school site. Responsible for the evaluation of the data collected and written report to provide conclusions and recommendations.

Additions to Wells Intermediate School, Dublin, CA

Responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

John Muir School, Antioch, CA

Responsible for preliminary fault rupture hazard investigation to evaluate if school site would be impacted by fault rupture of nearby Antioch fault. Also responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Responsible for providing conclusions and recommendations in written report form.

Building Modernization, Antioch Junior High School, Antioch, CA

Collected and evaluated data for geologic hazards investigation to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Subsequently, supervised day to day trench logging of site to determine if active or potentially active traces of the Antioch fault or related faults underlie proposed school site. Evaluated data collected. Aided Mr. Hoexter in the preparation of written report presenting results of fault rupture hazard investigation.

Building Modernization, Albany High School, Albany, CA

Responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

Portable Additions to San Leandro High School, San Leandro, CA

Responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

Hillcrest School, Antioch, CA

Responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

UCB Business School, Berkeley, CA

Responsible for trench logging performed for evaluating the location of active or potentially active traces of the Hayward fault at site.

Leland High School, San Jose, CA

Responsible for performing geologic hazards investigation including subsurface exploration to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

Jefferson, McKinley, Wilson, Garfield, Monroe, Roosevelt, Lincoln School sites and Barrel Field site, San Leandro, CA

Responsible for performing geologic hazards investigation including subsurface exploration at each site to determine if shaking hazards, soil liquefaction, seismically induced waves, inundation due to dam failure or embankment failure or other shaking hazards such as landsliding, lateral spreading and differential compaction would impact site. Evaluated seismicity history of immediate vicinity. Responsible for providing conclusions and recommendations in written report form.

Mills College, Oakland, CA

Geotechnical analysis of foundation soils for pavilion structure. Recommendations included mitigation of expansive soil, earthwork, drainage specifications and a pier foundation system. Pavement recommendations for several parking lots were given, including an asphaltic concrete and gravel section using a filter fabric foundation

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South East Elementary School, Antioch, CA

Fault rupture hazard investigation for proposed elementary school site. Recommendations and conclusions regarding the potential for fault rupture were provided.

Redwood Heights Recreation Center, Oakland, CA

Responsible for logging of trench to evaluate location of potentially active or active traces of the Hayward fault. Responsible for the evaluation of the data collected and aided in the written report providing conclusions and recommendations.

Bridges, Roads, and Pavements**Verona Ridge Bridge, San Mateo, CA**

Client: Taylor Morrison Homes

Provided geotechnical investigation for two-lane, 150 feet long bridge with two abutments and single, center bent over creek. Provided design and construction criteria for foundation alternatives including driven piles, drilled caissons, footings, and geogrid reinforced earth with shallow footings. Complex grading criteria required in order to develop site for the bridge.

North Going Street Bridge, Portland, OR

Client: Biggs Cardosa Associates

Mr. Ferrone provided geotechnical engineering for the seismic evaluation and retrofitting of this bridge in Portland. He performed preliminary lateral load analysis; liquefaction analysis; preliminary pile design; soil borings; geotechnical analysis; geologic review; foundation design detail review; plans and specifications review; and pile installation consultation during construction. The scope of work was performed within budget and schedule.

Stagecoach Road at Turquoise Street, Dublin, CA

Client: Whitley Burchett & Associates, Inc. for Dublin-San Ramon Services District

Mr. Ferrone acted as project engineer and geologist for a pavement distress evaluation performed to evaluate the existing pavement and subsurface conditions, determine cause of pavement failure, and provide recommendations for pavement repair and reconstruction. Conditions included a broken water pipeline, differential pavement heave, offset gutters, and cracked and failed pavement. Causes for pavement distress were due to flooding of baserock layer, reduction of subgrade strength, and water pressure disturbing baserock layer. Recommendations for pavement rehabilitation included removal of existing AC and portions of baserock, proof-rolling exposed base, stabilizing subgrade where necessary, deep patching, lime treating, treating with KD-83, and placing new baserock and asphalt concrete. Approximate construction cost estimates were also provided.

Service Roads, Oakley, CA

Client: Contra Costa Water District

The project included improving two sections of canal service roadway. A pavement investigation was undertaken by Mr. Ferrone to determine existing subgrade conditions and to provide pavement renovating and replacement alternatives. Subsurface exploration and laboratory testing of retrieved samples were performed. Pavement deterioration consisted of severe alligator cracking, rutted areas, subgrade failure, and subgrade raveling. It was determined that the pavement exceeded its life expectancy and required replacement. Pavement replacement designs and construction guide specifications were provided.

Neptune Drive, San Leandro, CA

Client: City of San Leandro

The purpose of Mr. Ferrone's pavement investigation was to evaluate the subgrade and subsurface soils and provide pertinent design parameters for the extension of Neptune Drive. Grades were raised as much as 10 feet to accommodate the roadway. Reconnaissance, subsurface exploration, laboratory testing, engineering analyses, and recommendations provided in a report were performed. The subsurface conditions included fills and landfill refuse overlying compressible Bay Mud. The primary design consideration included anticipated

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total and differential settlement of the new roadway. Recommendations for settlement mitigation, earthwork, and pavement design and construction were provided by Mr. Ferrone.

Embarcadero Road, Oakland, CA

Client: City of Oakland

The project entailed extending Embarcadero Road 2,350 feet to provide access to Jack London Square and associated facilities. Several new parking lots were also included in the project. The subgrade conditions included heterogeneous fill materials consisting of very loose to medium dense sands and gravels, and stiff clayey fill. Very soft clays were encountered below the fill materials. Numerous R-value tests were performed to evaluate subgrade conditions. Preliminary pavement designs were provided based upon several earthwork alternatives by Mr. Ferrone.

Building 87 Roadway, Concord Naval Weapons Station, Concord, CA

Client: U.S. Navy, Western Division Facilities Engineering

Mr. Ferrone performed a geotechnical investigation for an access road with a length of about 2,000 feet of roadway, 20 feet wide, with 3-foot wide shoulders. Grading to construct the road consisted of cuts and fills of up to 10 and 7 ½ feet, respectively. A grade change of about 150 feet occurred along the alignment. The area was found to have several landslides and unstable areas requiring repairs. Review of geological and geotechnical literature, interpretation of stereographic aerial photographs, reconnaissance, drilling exploratory borings, detailed evaluation and analyses of accumulated data, and report submittal were performed. Considerations for the design and construction of the project included slope stability, unstable material near the Clayton fault, saturated condition of surface soils, and subdrainage. Detailed earthwork and pavement design and construction criteria were provided by Mr. Ferrone.

Osgood Road, Fremont, CA

Client: Mackay and Soms

New pavement design and construction criteria were provided by Mr. Ferrone for new roadway, widening of several roads, and three new cul-de-sacs. Sample collection and R-value testing was performed to provide earthwork and pavement construction recommendations. The primary design consideration included the high to critical expansion potential of the subgrade soils. Pavement section alternatives included asphalt concrete over Class 2 baserock, asphalt concrete over Class 2 baserock over Class 2 aggregate subbase, and asphalt concrete over lime treated native soils.

Bayshore Boulevard at Geneva, Daly City, CA

Client: Brian Kangas Foulk

Renovation of three northbound and two southbound lanes required detailed pavement investigation by Mr. Ferrone. Investigation included reconnaissance, subsurface exploration, coring, laboratory testing, and detailed engineering analyses. Subgrade materials consisted of very loose to loose sandy fill and were unstable. Recommendations for earthwork, including subgrade preparation, were provided. Detailed pavement renovation design and construction criteria included overlays, and removal and replacement. Existing pavement preparation for overlays was also provided.

Third Street, Oakland, CA

Client: City of Oakland

Mr. Ferrone managed the pavement condition survey, subsurface exploration, laboratory testing, engineering analyses, and report submittal performed for Third Street renovation. Existing pavement condition included longitudinal cracking, alligator or map cracking, depressions, transverse cracking, and subgrade failure adjacent railroad tracks and utility boxes. Subgrade consisted of loose to dense, heterogeneous sands. The loose sands were and compressible. Detailed design and construction recommendations were provided including overlay requirements, replacement, and repair of utility trench backfill.

West A Street, Hayward, CA

Client: City of Hayward

Mr. Ferrone acted as the project manager and engineer. Project included widening West A Street twelve feet, providing a raised median, new bus turnouts, bike lanes, new curb and gutter, new sidewalks, and placing existing utilities underground. As-built plan review, reconnaissance, pavement distress mapping, pavement

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deflection testing, subsurface exploration, and R-value testing was performed to evaluate existing condition of pavement. Rehabilitation recommendations were provided to increase the life-span of the existing pavement. Rehabilitation alternatives included overlaying with AC or asphalt rubber hot mix, or removing and replacing with new pavement. Recommendations were given for new pavement where needed. Rigid concrete pavement design and construction criteria were provided for bus turnouts. General construction specifications were submitted for the various construction techniques.

Tassajara Road, Alameda County, CA

Client: MacKay and Soms

A pavement evaluation study was performed by Mr. Ferrone for the purpose of evaluating existing asphaltic concrete pavement performance, providing design and construction recommendations for the rehabilitation of the roadway to a level capable of handling anticipated traffic volumes, and providing a program for road maintenance. Reconnaissance, subsurface exploration, laboratory testing, engineering analyses, and report preparation were performed. Several repair alternatives were presented.

Green Valley Road, Fairfield, CA

Client: MacKay & Soms

The project included straightening and widening Green Valley Road for a distance of 6,000 feet, installation of new underground utilities, pipe jacking, and box culvert placement. Very soft to hard clays and loose to dense sands, and high ground water conditions, were encountered during our subsurface exploration within the roadway alignment. The subgrade soils were highly expansive. A liquefaction evaluation was undertaken to evaluate the liquefaction potential at the site. Considerations for the design and construction of the project included the weak subgrade soils, the high ground water conditions and liquefaction-induced settlement. Remediation recommendations were provided, and pavement design and construction alternatives were presented.

San Pablo Avenue Rehabilitation, San Pablo, CA

Client: City of Oakland

Project engineer for this pavement study on San Pablo Avenue between 16th Street and 35th Street. The project consisted of rehabilitating the San Pablo Avenue pavement to accommodate existing and future traffic. The pavement between 16th Street and 35th Street is approximately 7,600 feet in length, with two lanes, and locally three lanes, in both directions. The traffic index provided by the City of Oakland, Office of Public Works for the project was 10.5. Pavement overlays and new pavements are being considered. Consideration is also being given to using an asphalt concrete overlay containing reclaimed tire rubber.

Highway 101/Hillsdale Boulevard Interchange, San Mateo, CA

Client: Paine Webber

Mr. Ferrone serves as the geotechnical project manager for a major re-construction of the Highway 101/Hillsdale Boulevard Interchange. The project includes widening and modifying existing on-and off-ramps, realigning ramps, abandoning designated ramps, constructing soundwalls and retaining walls, and demolishing designated structures. Up to six meters of fill will be retained or placed to raise grades. On-site conditions include weak fill over highly compressible Bay Mud. Ground surface settlements are anticipated requiring deep foundation systems and the use of lightweight fill below new pavements. Mr. Ferrone works closely with the developer, contractor, Caltrans, and civil engineer to complete the project within Caltrans guidelines.

San Leandro Street Rehabilitation, Oakland, CA

Client: City of Oakland

Project engineer for rehabilitating the San Leandro Street pavement to accommodate existing and future traffic. The pavement between 47th Avenue and 54th Avenue is approximately 2,200 feet in length, with two lanes in both directions; the pavement between 75th Avenue and 77th Avenue is approximately 400 feet in length, with two lanes in both directions; and the pavement between 98th Avenue and the Oakland/San Leandro City Boarder is approximately 3,700 feet in length. The pavement between 98th Avenue and the Oakland/San Leandro City Boarder has two lanes in both directions at 98th Avenue and one lane, at surface level, in each direction from Stone Street to 105th Avenue. The southbound and northbound lanes enter a subway structure at Stone Street and return to the surface at Blenheim Street. There is one northbound lane at surface level from Blenheim

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Street to 105th Avenue. Mr. Ferrone worked closely with the City of Oakland Office of Public Works. Pavement overlays, new pavements, and the use of recycled tire rubber were considered.

McCarthy Boulevard-Phase 1, Milpitas, CA

Client: Joseph McCarthy, The McCarthy Ranch

Mr. Ferrone managed and performed the geotechnical investigation for constructing the extension of McCarthy Boulevard. In addition, a below grade pump station and associated lateral were constructed. The primary geotechnical concerns were: 1) the liquefaction potential of loose, subsurface sand layers, 2) the stability of existing embankments as a result of the proposed excavations for the pump station and lateral, and 3) the high ground water table.

Fostoria Parkway Extension, San Ramon, CA

Client: City of San Ramon

Supervised and performed subsurface exploration for the parkway extension through foothills. Extensive geologic mapping and slope stability analyses were performed. Recommendations regarding earthwork including cuts, fills and slope repair were provided. Various pavement design alternatives were recommended.

Teagarden Street, San Leandro, CA

Client: City of San Leandro

As-built plan review, reconnaissance, pavement distress mapping, Falling Weight pavement deflection testing, subsurface exploration, R-value testing, and truck and traffic counting were performed under Mr. Ferrone's supervision to evaluate existing condition of pavement. Traffic Index determined for 20-year design period. Mr. Ferrone provided three alternatives to minimize future pavement distress including: 1) Overlaying existing pavement with new AC or asphalt rubber hot mix, 2) grinding down or removing portions of existing pavement and replacing with new AC, and 3) removing and replacing existing pavement section. Design and construction criteria for all alternatives provided in report

Colorado Street Bridge Rehabilitation, Pasadena, CA

Client: Biggs Cardosa Associates

Mr. Ferrone provided geotechnical consultation for the seismic rehabilitation of this historic concrete arch bridge which spans the Arroyo Seco near the Ventura Freeway. The project consisted of using prestressed tendons drilled through the existing vertical members, through the base of the footings and into the underlying soil and rock materials. The prestressed strands were anchored by a combination of the underlying bedrock and soil materials and through friction between the anchor and the existing concrete columns. The geotechnical considerations included the need for increased bearing capacity to support the anticipated seismic loads, the affects of the grouted anchors on the foundation, the potential for caving of the underlying gravel and cobble soils, and the evaluation of the ability of the underlying weathered rock materials to resist the large tensile forces needed to anchor the structure.

Curtner Avenue Bridge, San Jose, CA

Client: Biggs Cardosa Associates

Mr. Ferrone reviewed available geotechnical information to provide recommendations for the seismic retrofit of a 36-foot wide, 165-foot long steel girder bridge. Recommendations were provided for the ultimate lateral, compression and uplift loads for this pile supported overhead structure. Geotechnical considerations included near surface soft soil deposits and a high water table. Geotechnical analyses were performed on the existing concrete vertical and batter piles.

5th Street Bridge, Sutter City, CA

Client: Biggs Cardosa

Mr. Ferrone performed a geotechnical investigation to provide seismic retrofitting design criteria for existing and new bridge foundations. The bridge was retrofitted by extending and strengthening existing piers and abutments. The new bridge pier extensions were supported on new vertical piles and pile caps.

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Coleman Avenue Connector Bridge, Santa Clara, CA

Client: Biggs Cardosa Associates

Mr. Ferrone performed a geotechnical investigation for a 185-foot long, 28-foot wide connector which is supported by two abutments and two columns on spread footing foundations. A review of existing information and a seismic analysis was performed. Recommendations for new large diameter Cast-In-Drilled-Hole (CIDH) foundations at the abutments were provided. Foundation installation considerations included granular soils and a relatively high water table.

Dutton Avenue, San Leandro, CA

Client: City of San Leandro

Mr. Ferrone performed and supervised the geotechnical aspects of the rehabilitation of existing pavement needed to accommodate existing and future traffic. Average Daily Traffic volumes given and truck traffic determined to calculate design Traffic Index. As-built plan review, pavement distress mapping, Falling Weight pavement deflection testing, subsurface exploration, and R-value testing were performed to evaluate existing and future condition of pavement. Detailed discussion of use of asphalt rubber hot mix material provided for overlaying existing pavement alternative. Recommendations included overlaying, re-moving pavement and replacing with deep lift of asphalt concrete, and replacing entire pavement section with new section.

Doolittle Drive Widening, Alameda, CA

Client: City of Alameda

Mr. Ferrone acted as the project engineer. Project included widening roadway from two lanes to four lanes and raising the pavement elevation three feet. Subsurface exploration was performed to depths as great as 60 feet due to subsurface conditions consisting of fill overlying highly compressible Bay Mud. In-situ resistivity tests to evaluate the anticipated settlement of new fill placed over compressible mud. Recommendations included criteria for site earthwork and new pavement sections. Special considerations included the use of light-weight fill to minimize settlements.

Merlot Court, Napa, CA

Client: Kemper Real Estate

Mr. Ferrone provided recommendations and general specifications for design and construction of new roadway. The roadway was to extend across existing field within a swamp. Primary considerations included subgrade stabilization, subdrainage, and compaction quality. Recommendations for the new roadway were presented in report.

Tamalpais Drive Overcrossing, Corte Madera, CA

Client: Biggs Cardosa Associates

Mr. Ferrone performed a geotechnical investigation for this 802-foot long steel and concrete girder bridge. Subsurface conditions at the site consisted of up to 80 feet of soft Bay Mud deposits overlying hard Franciscan sandstone. Geotechnical considerations included soil structure interaction during seismic events and lateral load resistance in the soft Bay Mud soils. Recommendations were provided for the ultimate lateral load resistance, compression and uplift loads of the existing and proposed new pile foundations. Construction considerations included low overhead working conditions.

Bay Meadows-Saratoga Avenue, San Mateo, CA

Client: Calthorpe Associates

Project engineer for this pavement study and soil stabilization study at the Highway meeting at the City of San Mateo. Provided review, engineering, and preparation for these meetings. Mr. Ferrone also reviewed the Master Plan at the 50% submittal and 95% submittal, providing additional input including writing, engineering and letter submittal necessary for the completion of the Master Plan. Further work included preparation of three additional plans for surcharging the practice track area. In addition, Mr. Ferrone performed a subsurface investigation for the Saratoga Avenue Improvement Project between the practice track area and Delaware Street. The purpose of the subsurface investigation was to determine if surcharging of the Saratoga Avenue alignment would be necessary between the practice track area and Delaware Street.

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Fostoria Parkway, San Ramon, CA

Responsible for field investigation of proposed roadway within foothills of San Ramon. Evaluated stability of site and provided recommendations regarding stability of cut and fill slopes. Provided conclusions on the excavatability of the subsurface soils and rock.

Bedford Aviation Hangar-Buchanan Field, Concord, CA

Geotechnical investigation for an approximate 140- by 150-foot aviation hangar located at Buchanan field. In addition, a concrete apron was located adjacent the hangar.

Access Road to Los Gatos Creek Bridge, Campbell, CA

Design of a pile supported access roadway over a closed landfill underlain by dense gravels. Various alternative foundation systems including caissons and piles were provided.

Bryant Street Parking Garage, Mountain View, CA

Design of a multi-level parking garage with commercial space on a site underlain by alluvial soils and highly expansive clays. Structure included one below grade level and three suspended levels. Recommendations and conclusions regarding foundation support, uplift resistance and site period were provided.

McCarthy Boulevard-Phase 1, Milpitas, CA

Geotechnical investigation for constructing a Phase 1 portion of the proposed extension of McCarthy Boulevard, a distance of approximately 3,400 feet. In addition, a below grade pump station and associated lateral were to be constructed. The pump station and lateral were to extend to depths of about 16 to 20 feet. The primary geotechnical concerns were: 1) the liquefaction potential of loose, subsurface sand layers, 2) the stability of existing embankments as a result of the proposed excavations for the pump station and lateral, and 3) the high ground water table.

Fostoria Parkway Extension, San Ramon, CA

Supervised and performed exploration for the parkway extension through foothills. Extensive geologic mapping and slope stability analyses were performed. Recommendations regarding earthwork including cuts, fills and slope repair were provided. Various pavement design alternatives were recommended.

Hangars for Buchanan Airfield, Concord, CA

Geotechnical engineer for the design and construction of several existing and 41 proposed corporate hangars over former marsh lands consisting of uncompacted fills, highly compressible soils, and potentially liquefiable sands and silts.

Greenbrae Pedestrian Overcrossing, Larkspur, CA

Geotechnical investigation for the seismic retrofit of a pedestrian overcrossing. This project was authorized as a portion of the 3,500 bridge retrofit projects being performed by Caltrans. The overcrossing has a total length of approximately 619 feet and a maximum width of about 11 feet. The structure is a concrete precast girder type with precast reinforced concrete slabs.

Curtner Avenue Bridge, San Jose, CA

Reviewed available geotechnical information to provide recommendations for the seismic retrofit of a 36-foot wide, 165-foot long steel girder bridge. Recommendations were provided for the ultimate lateral, compression and uplift loads for this pile supported overhead structure. Geotechnical considerations included near surface soft soil deposits and high water table. Geotechnical analyses were performed on the existing concrete vertical and batter piles.

Scott Boulevard Overhead Bridge, Santa Clara, CA

Geotechnical investigation for a 217 foot-long 69 foot-wide overhead supported by two pier walls and two abutments. Geotechnical considerations included soft subsurface soils. Recommendations were provided for load carrying capacities of the existing pile foundations. The retrofit will include installing new cable restrainers longitudinal shear blocks, bearing seat extensions and constructing transverse cross-bracing.

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Coleman Avenue Connector Bridge, Santa Clara, CA

Geotechnical investigation for a 185-foot long, 28 –foot wide connector which is supported by two abutments and two columns on spread footing foundations. A review of existing information and a seismic analysis was performed. Recommendations for new large diameter Cast-In-Drilled-Hole (CIDH) foundations at the abutments were provided. Foundation installation considerations included granular soils

Strawberry Pedestrian Overcrossing, Mill Valley, CA

Performed a geotechnical investigation for the seismic retrofit of a pedestrian over crossing. This project was authorized as a portion of the 3,500 bridge retrofit projects being performed by Caltrans. The bridge has a total length of approximately 160 feet and a maximum width of about 11 feet. The overcrossing is a concrete precast girder type with precast reinforced concrete slabs and spans across State Highway 101.

Pedestrian and Equestrian Bridge, Martinez, CA

Geotechnical investigation for design and construction of a pedestrian bridge on a site underlain by soft, interbedded clays and silts. Recommendations and conclusions regarding caisson foundations were provided.

Malone Road Bridge, San Jose, CA

Design and construction of a replacement bridge over Guadalupe Creek. The new bridge will consist of a 2-lane, three-span reinforced concrete pile supported bridge. Subsurface conditions at the site consisted of interbedded clay and gravel

Hedding Street, Coleman Street, Coyote Creek Bridges, San Jose, CA

Geotechnical investigation, review and analyses for seismic upgrading. Recommendations for vertical and uplift capacities of pile foundations, additional recommendations for abutments and wing walls.

Oakland Airport, Oakland, CA

Geotechnical engineer for the design and construction of runway pavements and docking areas.

Pipeline/Pump Stations**Various Projects, Contra Costa County, CA**

Client: West County Wastewater District

Mr. Ferrone has continuously served as a geologic and geotechnical consultant for the major utility company. Mr. Ferrone routinely evaluates existing pipeline alignments or proposed alignments where settlement, landslide activity, or erosion has or may affect one of the company's sewer lines; to determine the nature of the problem; and provide recommendations for corrective measures. As part of the evaluation process, investigations requiring literature review, air photo analysis, field mapping, borings, sampling, and lab testing are performed. He provides opinions, conclusions, and recommendations regarding the short-and long-term stability of the pipelines, including corrective designs as needed. He also provides observation and testing services during the construction phases of the projects. Harza has performed each of the authorized scopes of work within budget and schedule.

PGT/PG&E Pipeline Expansion Project, CA

Client: Bechtel Corporation

Provided geotechnical engineering services for a number of river and slough crossings for the northern California segment of a 36- or 42 inch diameter natural gas pipeline. Both over-crossings and under-crossings are planned for the proposed pipeline which is to be parallel to an existing pipeline that was installed using open cut methods. Subsurface conditions encountered at the various crossings ranged from bedrock to dense alluvial gravels and large peat deposits. Recommendations for the crossings included surface footings, open-cut trenching, directional drilling and micro-tunneling.

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Sacramento/San Joaquin River Delta Crossing, San Joaquin County, CA

Client: Bechtel Corporation

Provided geotechnical engineering services for approximately 19 miles of a 42-inch diameter gas pipeline crossing the Delta area. Five river, slough and aqueduct crossings were performed, requiring directional drilling and microtunneling techniques. Each crossing was performed within extremely environmentally sensitive terrain, requiring very rigid protocol. In the lands within the Delta area, Fluctuations in near surface water levels, and the existence of large peat deposits at or near the ground surface were the primary concerns of the project. Determination of the thickness of peat, soft mud, and loose sand deposits was critical to the evaluation to prevent channel bottom "blow out." Alternate drilling methods were evaluated to Permit the required flexibility in accomplishing the objective of the subsurface investigation given the heterogeneous geologic conditions and the potential for "heaving" sands.

Fall River Crossing, Near Burney, CA:

Client: Bechtel Corporation

Provided geotechnical engineering for the installation of a 36- and 42-inch diameter natural gas pipeline using directional drilling construction methods. The pipeline is parallel to an existing gas pipeline which was installed using open-cut construction methods. The entrance inclination angle of the directional drill was about 10degrees to the horizontal. A pilot bore was drilled under the river in an elliptical shape at a radius of between 1,600 to 4,000 feet. The pilot bore was followed by a reaming drill pass and installation of the pipe. Zones of very loose to loose and very soft to soft deposits were generally encountered to a depth of 25 feet and required special consideration during the directional drilling operations. Use of special drilling fluids and casing of the borehole was required during the directional drilling operations because of the soil sensitivity to disturbance.

Lost River Crossing, Olene, OR

Client: Bechtel Corporation

Geotechnical engineering for the installation of a 42-inch diameter natural gas pipeline crossing beneath a river. The proposed pipeline was parallel to an existing 36 inch diameter gas pipeline which was installed using open-cut construction methods. Boring and jacking methods were used to install the new pipeline below Lost River to minimize the construction and installation impact on the river. Characterization and conclusions regarding the stability of the subsurface deposits were provided and it was determined that the boring and jacking method was feasible.

60-and 66-Inch Water Aqueduct Pipeline Relocations, Fremont/Newark, CA

Client: Bissell and Karn

Mr. Ferrone performed the geotechnical engineering for relocating 60- and 66-inch diameter water pipelines at three flood control channel crossing locations and reconstructing the channels following the pipeline relocation. At all three sites, the existing 60-inch diameter riveted steel pipeline and 66-inch diameter welded steel pipeline cross the flood control channel above the channel invert and represent a partial obstruction to potential flood flows. The pipelines were relocated at the crossing sites along the existing pipeline alignment by installing new pipeline sections at "invert" depths of about 8 to 9 feet below the channel bottom. Excavations of 15 to 18 feet below the top of channel were performed to accomplish the pipeline relocations. Grade control measures such as a buried concrete lining and drop structures at two of the sites were required to prevent scouring of the channel. In the vicinity of the pipeline crossings. The Primary project consideration from a geotechnical standpoint was the constructability of relocating the pipelines due to the presence of cohesionless soils and a relatively high ground water level.

24-Inch Diameter Conveyance Pipeline, Napa, CA

Client: Carollo Engineers

Geotechnical investigation, construction consultation and observation services for Napa Sanitation District's 900 feet of 24-inch diameter pipe. Geotechnical engineering for this project also included jacking pipe and tunneling beneath State Highway 29 and Kelley Road, trench shoring and dewatering during construction

Calero Park Pump Station, Pipeline and Storage Tank, San Jose, CA

Client: Greiner Engineering

Performed geotechnical engineering for a pump station, pipeline and a 40- foot diameter storage tank with a capacity of about 100,000 gallons. Primary consideration for pipeline and foundation design was the

Kenneth C. Ferrone

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excavatability of the existing bedrock. Pockets of resistant material were encountered during our subsurface investigation which was difficult to remove with standard earthmoving equipments. Therefore, to remove the resistive bedrock, it was necessary to utilize heavy ripping equipment and/or a hoe-ram.

LAVWMA Pipeline-Tasks 2 and 3 (10 miles), San Leandro, CA

Client: Whitley, Burchett & Associates

Project engineer for geotechnical investigation and design and slope stability study for this pipeline. The proposed alignment extends from the eastern limits of Castro Valley on the east to the San Leandro shoreline on the west. The alignment extends along existing roadways and adjacent to roadways, with very few overland routes.

Leland Water Main, West Pittsburg, CA

Geotechnical investigation for over 2 miles of water main pipeline. Terrain included rolling hills marshland, ponds and streams. Recommendations concerning bedding, backfill, shoring, trenching and subgrade stabilization were given.

Albany I/I Pipeline, Albany, CA

Geotechnical investigation of pipeline to be located within city streets, adjacent private property and along creek banks. Special considerations included stability of temporary trench walls, subgrade and short-term effects of trenching adjacent and underneath improvements. Stability of creek banks were analyzed and evaluated from a geotechnical engineering standpoint.

Sanitary Sewer Outfall-Lands of McCarthy, Milpitas, CA

Geotechnical investigation for construction of a 30-inch to 45-inch sanitary sewer with associated sanitary sewer laterals extending a distance of approximately 9,200 feet. The sewer was constructed within an area of high liquefaction potential and a shallow ground water table. Primary geotechnical considerations included settlement, dewatering techniques, lateral earth pressure, shoring and temporary construction slopes, bedding and backfill, and the influence of an adjacent 30-foot high embankment. Subsurface materials encountered included soft to firm silts and clays and loose fine-grained sands.

Fall River Crossing, Near Burney, CA

Provided general geotechnical recommendations for the installation of a 36- or 42-inch diameter natural gas pipeline using directional drilling construction methods. The proposed pipeline is parallel to an existing gas pipeline which was installed using open-cut construction methods. The entrance inclination angle of the directional drill will be about 10 degrees to the horizontal. A pilot bore will initially be drilled under the river in an elliptical shape at a radius of between 1,600 to 4,000 feet. The pilot bore will then be followed by a reaming drill pass and installation of the pipe.

Sanitary Sewer line, Fremont, CA

Design and construction criteria provided for about one and a half miles of relocated sewer line. Site conditions included a high ground water table, liquefiable soils, and an unstable subgrade. Shoring design, pipe jacking, dewatering and subgrade stabilization recommendations were provided.

Tassajara Road Reservoir and Transmission Main, Alameda County, CA

Geotechnical and geological investigation for a 13-million gallon reservoir and 12 mile transmission main. Aerial photographs were reviewed and site and vicinity mapped to evaluate stability of site and transmission line. Excavatability, foundation and lateral support recommendations were given for the reservoir and bedding, backfill and shoring recommendations were provided for the transmission main.

Leland Water Main, Pittsburg, CA

Responsible for evaluating stability of proposed pipeline extending through foothills. Geologic mapping and subsurface exploration required. Provided conclusions and recommendations.

Sanitary Sewer Outfall-Lands of McCarthy, Milpitas, CA

Geotechnical investigation for construction of a 30-inch to 45-inch sanitary sewer with associated sanitary sewer laterals extending a distance of approximately 9,200 feet. The sewer was constructed within an area of

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high liquefaction potential and a shallow ground water table. Primary geotechnical considerations included settlement, dewatering techniques, lateral earth pressures, shoring and temporary construction slopes, bedding

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Pump Station "A", Dublin, CA

Design and construction of a below grade pump station on site underlain by fill and colluvial soils. Recommendations and conclusions regarding earthwork and placement of fill, foundation design criteria and design criteria for below grade walls were provided.

California Landing Pump Station, Newark, CA

Geotechnical investigation for a below grade pump station within a residential development. Subsurface conditions consisted primarily of clay. Recommendations and conclusions regarding foundation support, dewatering, and below grade wall construction were provided.

Marine/Levees/Port Facilities**Berth 34-Port of Oakland, Oakland, CA**

Client: Port of Oakland

Project Geotechnical Engineer and manager for geotechnical investigation for port of Oakland Outer Harbor facility. The existing berth is constructed of a hydraulic fill placed between rock dikes. Geotechnical concerns included liquefaction and potential for lateral spreading of the dike materials into the Harbor. Slope stability analyses were performed using both static and dynamic (earthquake) input motions. Recommendations for slope stabilization revetment were provided including pile supported bulkheads. Provided geotechnical engineering support services during the design and construction of the project.

Mariner Square Drive Bulkhead Repair, Alameda, CA

Client: City of Alameda

Project manager for the geotechnical investigation of the bulkhead wall for the Webster Street tube traversing the Oakland Estuary between the cities of Oakland and Alameda. The bulkhead was moved laterally towards the Oakland Estuary during the October 17, 1989 Loma Prieta earthquake. The bulkhead was driven through hydraulic fill above the Webster Street Tube. Recommendations were provided to densify the hydraulic sandfill to prevent additional movement during future earthquakes.

Peyton Slough Project, Martinez, CA

Client: Contra Costa Mosquito & Vector Control District

Project engineer for geotechnical investigation and design, geologic hazards study and slope stability study. Mr. Ferrone provided bearing capacity design criteria for a proposed flood control gate, and investigated the characteristics of potential borrow soils for the proposed raising of levees at Peyton Slough. Mr. Ferrone provided earthwork recommendations for the construction of the levee.

Redwood Landfill Areas a, 1b and 1c, Slope Stabilization, Novato CA

Client: USA Waste Services/Sanifill

Mr. Ferrone was project engineer for the proposed stage 1b and 1c Levee Project to be located at the Redwood Sanitary Landfill in Marin County, California. The project consisted of the design and construction of a new perimeter levee in the north and northwest portion of the landfill which included levee stages 1b and 1c. Stage 1b included approximately 4,000 lineal feet of levee, and stage 1c approximately 2,000 lineal feet. The landfill is surrounded by an existing perimeter levee that consists of materials generated on-site from Bay Mud

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materials or were imported onto the site. These levees have crest elevations ranging from +6 to +10 feet. Goals of this project included stability of the perimeter levee when subject to the refuse fill loads; environmental protection through containment; and protection of the landfill area from flooding.

Matson Terminal, Port of Oakland, CA

Client: Port of Oakland

SFB engineers performed the geotechnical evaluations of the terminal immediately after the October 17, 1989 Loma Preita earthquake and provided ground modification and stabilization measures to ensure continual operation of the terminal. The subsurface conditions included liquefaction, lateral spreading, poorly consolidated fills, and lurching. The engineers' knowledge of the area allowed for cost-effective and timely solutions. Performed subsurface exploration and stability analysis for pavement affected by liquefaction, lateral spreading, and lurching due to the October 17, 1989 earthquake. Recommendations for repair of pavement in a timely manner. The terminal remained in operation throughout the construction process.

Rehabilitation of Berthing and Docking Facility, Alameda Naval Air Station, Alameda, CA

Geotechnical engineer for the rehabilitation design of foundations for existing piers and berths to support naval maintenance operations and training for recovery operations.

APL Terminal, Port of Los Angeles, Los Angeles, CA

Client: Port of Los Angeles

Geotechnical investigation for re-construction of Berth 126. Berth site was underlain by fill, and interbedded sand, clay and silt. Recommendations and conclusions regarding liquefaction, lateral spreading, and foundation support were provided.

Parks**Proposed Bridge-California Hiking and Riding Trail, Martinez, CA**

Performed a foundation investigation for a riding and hiking bridge with an 8-foot width and a 50-foot span. The bridge was prefabricated of steel and supported at bank abutments. The primary consideration for foundation design of the bridge was the slightly weak and compressible soils underlying the site. A caisson foundation system was required for bridge support.

Sacchi Staging Area, Martinez, CA

Performed a geotechnical investigation for a staging area and included grading the site, including minor cutting and filling to level the site, and creating areas for parking and access. Cuts up to 4 feet and fills up to 6 feet deep were required to develop the site. Subsequent to the grading and earthwork, a portion of the site was to be paved with asphaltic concrete and aggregate baserock and another portion to be paved with baserock only. Installation of storm drains and associated culverts, and evaluation of the stability of the adjacent hillsides were included in the project.